2. Count Them Up

Program Name: Count.java Input File: count.dat

Did you ever wonder how many different ways there were to pick a 1st, 2nd, and 3rd place winner out of 10 runners? Ever want to know how many different possible hands of poker there are? If you want to figure out how many different groups of 6 you can make from a group of 30 people, you need to learn how to count using combinations and permutations.

A permutation is one of the different arrangements of a group of items where order matters. In other words the arrangement (a, b) is distinct from the arrangement (b, a). The following formula is used to calculate the number of permutations given n total elements and choosing r of them to be in a given permutation:

$$\frac{n!}{(n-r)!}$$

A combination is one of the different arrangements of a group of items where order does not matter. In other words the arrangement (a, b) is equivalent to the arrangement (b, a). The following formula is used to calculate the number of combinations given n total elements and choosing r of them to be in a given combination:

$$\frac{n!}{r!\,(n-r)!}$$

Write a program to calculate the number of different combinations or permutations given different values of n and r.

Input

- The first line of the data set is a number M that indicates the number of data sets.
- Each line contains a number $1 \leq n \leq 60$, followed by either a P or C, then a second number $0 \leq r \leq 60$. You are guaranteed $r \leq n$. No spaces will be present in a data set.
- nPr is to be read as "n pick r". Calculate the number of permutations.
- nCr is to be read as "n choose r". Calculate the number of combinations.

Output

Display the number of different combinations or permutations there are for each data set, one line of output per dataset.

Example Input File

```
6
16C3
10P2
25C13
30P4
60P10
60C10
```

Example Output To Screen

```
560
90
5200300
657720
2735898472315008 00
75394027566
```

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Program Name: Count.java Input File: count.dat

Judges Input File

```
13
16C3
10P2
25C13
30P4
60P10
60C10
16C12
20P13
25C24
20C0
10P0
25P15
60C55
```

Judges Output to Screen

```
560
90
5200300
657720
2735898472315008 00
75394027566
1820
482718652416000
25
1
1
42744736671436800 00
5461512
```